Ice Dams and Icicles

Problem

Ice dams are ridges of ice and icicles caused by melt water from further up the roof re-freezing lower on the roof. The “dam” created by the ridge of ice along the eaves can trap further melt water and result in significant leakage under and through the roofing, the roof structure, or the ceiling and walls below. Large icicles along the eaves can become a danger to people below if they fall.

Causes

The fundamental cause of ice dams is a result of part of the roof becomes warm enough to melt snow that is lying on the roof, the snow will melt and water will run down a sloped roof. If the water encounters a cold surface, the water turns to ice. Ice dams result from a difference in temperature on the roof surface where the upper part of the roof is warmer than the lower.

Common Causes

- Warm air entering space below roof membrane, causing warming and melting of snow. Air leakage through ceiling plane increases the temperature of an attic space or the underside of the roof membrane.
- Poor or insufficient insulation.
- Heat sources in attic.
- Poor ventilation.
Solutions

• Air leakage—attic hatch, space conditioning ducts, plumbing stacks and penetrations, chimneys, electrical penetrations, light fixtures, recessed lights and perimeter walls are potential leak sources.

  ▪ Sealant/caulking can be used to fill small openings and gaps.
  ▪ Expanding polyurethane or acrylic foam should be used around openings no more than one inch in size.
  ▪ For large openings, drywall with taped joints should be used.

• Insulation—the more insulation provided on the interior, the more unlikely enough snow will collect to cause melting.

  ▪ Depth of insulation depends on the climate, however it is recommended a minimum or R30 be provided below ventilated attic roof membranes, R35 below ventilated cathedral ceilings, and R40 below unventilated cathedral ceilings. These recommendations should be increased for very cold climates. (DOE Zone 6 or higher).

• Heat sources in attic—air leakage from ducts placed in the attic can also act as a significant heat and moisture source, and cause both condensation and snow melting. If sources are already there, adding a significant amount of insulation and an airtight blanket around them will reduce the source of heat being introduced into the attic.

• Ventilation—keeping the underside of the roof sheathing close to the exterior temperature is the best solution. This is achieved with good ventilation and good insulation acting together.

• Waterproofing membrane—a self-sealing waterproofing membrane should be installed on the roof high enough to resist six to eight inches of water above the edge of the wall insulation.
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